Technical Data Sheet
ATI 617™ Alloy

General Information

ATI 617™ alloy (UNS N06617) is a nickel-based superalloy with excellent creep-rupture strength and oxidation resistance at temperatures over 1800°F (980°C). Its high-temperature strength is realized by solid-solution strengthening from the molybdenum and cobalt additions, while chromium and aluminum additions impart its good cyclic oxidation and carburization resistance. ATI 617 alloy is resistant to a variety of both reducing and oxidizing media.

ATI 617™ alloy is primarily used to manufacture combustion cans, inner housings, ducting, and transition liners for both aerospace and land-based gas turbines. The alloy has lower density than comparable high-temperature, tungsten-containing alloys of similar strength, resulting in an advantageous strength-to-weight ratio. Alloy 617 is also used in the chemical processing industry and as components in both fossil-fueled and nuclear power-generating plants. It is currently under evaluation for helium-cooled reactor components. Alloy 617 is one of the few materials covered by the ASME Boiler and Pressure Vessel Code with design stresses up to 1800°F.

Forms and Conditions Available

The ATI 617™ alloy is available as coil, sheet, and plate. It is typically provided in the solution annealed condition.

The ATI 617™ alloy is covered by the AMS 5888 and 5889 specifications for plate and coil, respectively.

AMS 5888 and 5889 Specification Limits for UNS N06617 Composition	
Element	Weight Percent
Carbon	0.05 – 0.15
Manganese	0.50 max
Silicon	0.50 max
Phosphorus	0.015 max
Sulfur	0.015 max
Chromium	20.00 – 24.00
Cobalt	10.00 – 15.00
Molybdenum	8.00 – 10.00
Aluminum	0.80 – 1.50
Titanium	0.60 max
Boron	0.006 max
Iron	3.00 max
Copper	0.5 max
Nickel	Remainder

Technical Data Sheet
ATI 617™ Alloy

Physical Properties

Density	0.302 lb/in³ (8.32 g/cm³)
Melting Range	2430 – 2510 °F (1330 – 1380 °C)
Electrical Resistivity	48.1 μΩ·in (122 μΩ·cm)
Thermal Conductivity	94 Btu·in/ft²·h·°F (13.4 W/m·K)
Specific Heat	0.100 Btu/lb·°F (419 J/kg·°C)
Coefficient of Thermal Expansion, RT – 200°F	7.0 × 10^{-6} in/in·°F (11.6 μm/m·°C)

Mechanical Properties

Typical room temperature mechanical properties of solution annealed ATI 617™ alloy are listed in the table below.

Product Form	Tensile Strength		Yield Strength		Elongation
	ksi	MPa	ksi	MPa	%
Plate	118	810	60	410	54
Coil	118	810	55	380	58

Fabrication

Forming / Welding / Joining

ATI 617™ alloy is readily formed and welded by conventional techniques used for nickel alloys. The alloy has good fabricability, though it has a relatively high work hardening rate. The hot-forming characteristics of ATI 617™ alloy are similar to those of ATI 625™ alloy.

Heat Treatment

Solution annealing of ATI 617™ alloy is normally performed at a temperature of 2150°F (1175°C) for a time commensurate with section size. The solution annealed condition provides a coarse grain structure for very good creep-rupture strength.